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Evaluating the Role of Information and Communications Technology in Sustainable Urban Development: A Case study in 17th and 20th districts of Tehran city

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Abstract

The concept of the city is different at different times and locations. After agricultural and industrial issues, urban areas have been concerned. By increasing evolution and population and evolve complex cities, human requirements and solving the problems became more complex. To meet these requirements, the concepts of well-being, safety, comfort, environmental protection, development have been highlighted and different tools and methods were used to meet them. In the meantime, the concept of sustainable development have been concerned, and technology and information and communication technology have been introduced as one of the new emerging methods to solve many problems.

In this paper, the concept of sustainable development and its elements and the concept of information and communication technology are examined. Finally, the necessity and importance of information technology are discussed to achieve sustainable development. The results indicated that the use of ICT to achieve sustainable development is inevitable in some cases. Librarian and field methods and interview in district was used to collect information. According to Friedman test, there is a significant difference between average of available indexes to development the information and communication technology.

Keywords: ICT, Sustainable Urban Development, 17th and 20th Districts of Tehran

Introduction

Human lives in the city, so it is concerned in sustainable development. Sustainability is a purpose of urban development to provide welfare and reduce poverty in the society and cities. Therefore, new technologies should be provided in the society to achieve dynamicity and well-being of residents. Todays, ICT is one of indexes of development sustainability. Nowadays, ICT is concerned in most of developed developing countries due to its effect on sustainable developing.

The phenomenon is convergence of information technology and is called ICT revolution. Telecommunication leads to some achievements including mobile phone and fiber optic networks. Although, mobile cellphones with standards of global system of mobile communication (GSM) cause to growth in voice mail and telecommunication, but in 1997 connecting the cell phones and internet made a new approach to up-to-date world technology by combining voice communication and internet performance entitled wireless application protocol with remarkable progressing of investing and technological development (Darnell and Feder, 2005: 45).

ICT includes hardware, processors and systems to store, guidance, delivering and sharing information. Thus, the ICT is effective as a comprehensive phenomenon in the full spectrum of human activity from individual applications to economic and political activities. This phenomenon is versatile and flexible and has multiple features, which allows appropriate solutions in the form of individual or local applications and provides various needs (UNDP, 2005: 24). ICT provides the possibility of the emergence the network society in which re-identifies people and communities in a

new form, and gives a new definition of human. At the same time that network is affected by internal dynamics, changes in permanent and thus create new patterns of life and vital in different places (Castells, 2001: 20).

Information and communication technology (ICT) could connect urban communities as a bridge to other parts of the world and destroy social isolation around the people. The information and communication technology because of its integral features and also because of empirical evidence indicating high participation in achieving development goals and can be used as a powerful tool in development. ICT can be micro or macro and leads to efficiency and participation in the development, improve governance and reduce costs of provided services. In addition, ICT plays a stable role in accelerating development and social and economic dynamism in developing countries (UNDP, 2005: 23).

Knowledge about ICT in sustainable urban development, local sensitivity and the stability issue are of the focal point that Michael Gorstain calls as informatics community and in the context of sustainable urban development points out that access to ICT can provide a set of resources and tools for social and individual life to use the tools and resources to achieve their goals (Azkia, 2008: 406). Therefore, it was suggested that ICT influences on economic, social and cultural dimensions and can have an important role in sustainable urban development (Goldkuh, 2007: 135-159). Therefore, Following questions are provided in this field:

Is there any significant relation between features of studied families and degree of ICT application?

What is the greatest effect of ICT on which dimensions of sustainable urban development?

Objective of the study

This research aims to study the role of information and communication technology in sustainable urban development by investigating some districts to provide some suitable solutions in developing and providing services to the citizens and different urban organizations.

Literature review

ICT

ICT is a set of technologies that facilitate human information processes and communications by electronic devices. This definition is consist of a wide range of information and communication technologies including radio, TV, phone, cellphone, fax, computer and Internet. In general, the applications of ICT in urban development in specific aspects are classified in these subcategories:

• System to support decision-making of executers,

• Developing a system for providing services to citizens, and

• A system for the development of citizen to access the information and enable them to connect to network and share information (Vedakumari, 2005, 4).

ICT theories

Access to urban development is not possible without a theoretically approach or appropriate theories in the society. This is based on reasonable theory or theories that can plan practical actions that require strong leadership to coordinate non-stop programs to achieve the desired objectives. These ideas are as follows:

Table 1: Theories of information and communication technology

Approach	definition	theory
Available approaches about elimination the digital gap could be divided into two major part: first that are not little, believe that the digital gap is only solvable by global access to internet, in this viewpoint connection will create when everything else such as proper usage, concept creation and so on create Spontaneously. Fan of this approach believe that the societies which realized the necessarily of using technology ,have a shortcut and economic path to industrialization, provided that the transfer speed of industry and technology be in accordance with internal specialist and experts training. in this viewpoint lack of access to internet and internet gap between poor and rich peoples are considered as a poverty index that leads to technical potentials in reach to usability and income.	One of the features of the information and communications era is create a kind of imbalance in access to information and ICT facilities which is called the digital gap. The digital divide reflects the poverty and lack of adequate education, sanitation and other social needs, but nothing can force a society to fill the digital divide unless adequate literacy, poverty and health care be considered in societies .digital gap is a multi-dimension concept that consist of completely separated three aspects. The digital gap that returns to the differences between developed and in developing countries in internet accessibility. Social gap that consist of information distance of poor and rich in a country and the third mode is in the online society (democratic gap) can mean the difference between someone who use of equipment and digital resources and who do not use.	Digital gap theory
Analysis of economic development in a number of industrialized countries between 1920 and 1950 show that countries that were more motivated in success, their economic development has been done faster than anyone else. The analysis that has been done in some cases of current historical era ,show high degrees of success and immediately create a period of economic development and in the mode that economic progressing has reached to its highest point ,the success motivation has reduced and on the contrary reducing the success motivation is accompany with an economic downturn.	McClelland is defined the need to achieve success as (the desire to do something before it is due to the successful acquisition of social prestige, with the aim of achieving a sense of inner virtue. Need to succeed is different from person to the other person. Communities are different in this respect. Countries, groups, religions and social classes in different historical periods have varying degrees of success motivations.	Development motivation theory or need to success
From the perspective of the theory of diffusion, the nature of the spatial diffusion is analyzed on two levels, including district diffusion and spatial displacement of diffusion: District diffusion: is the stage where the information, materials, products, fashion, health, manufacturing and so on reach from region to another region and expands between populations is another new area. Sometimes the intensity of innovations and phenomena in new the area is more than origin of phenomena and innovations. Spatial displacement of diffusion: pass the same stages of expanding diffusion, but the main place of diffusion, information, materials, diseases and innovations, becomes empty gradually and destroy the source of the diffusion. As in parallel of diffusion from original locations to another location, source of diffusion lose its importance and credibility .as the rural-urban migration, the movement of the votes of the electoral parties, going away the people from main ghettos in cities are examples of this diffusion (Kevin, 1972, 91).	Spatial diffusion theory first proposed in 1953 by (Thorsten Hagerstrand), and then was published in 1968 in the book of spatial diffusion of innovation process in Sweden, introduced its new principles and then extended it. Hagerstrand et al first apply the diffusion theory in developing agricultural innovations and phenomena and then by applying this theory in procedure of spreading bovine TB in different years, achieve valuable experiences and finally this theory until 1968 achieved new and sustainable principals. Hagerstrand research work found countless fans in English-speaking countries, especially America, and its practical methods were used in applied geography. Now, diffusion theory is used in a lot of planning and known as one of the important area of spatial analysis process	Spatial separation theory

Previous studies

In table 2, the summaries of studies related to the research are presented:

Table 2: Summary of internal and external research history

Name Of Researcher	Topic of research	Result of research
Pour Heidari, Khaksari And Doost Mohammadi, 2009	Study the quality of ICT at offices in Kerman telecommunication company	All quality dimensions of services effect on customer expectation
Shakeri Et al, 2010	Identify the influencing factor on acceptance of ICT offices in Sistan and Baluchistan province	All factors were effective on acceptance of rural ICT offices, but effect of influencing factor on ICT service acceptance was not identical by all rural and all factors.
Saraei and Aminin, 2011	Effect of quality service of ICT offices in Rasht city	Quality dimensions are effective on customer expectation and the priority of these dimensions are empathy, physical factors, confidence, responsiveness assurance
Molaei Hashjin, Moradi And Mohammadi, 2012	Role of ICT in offices in rural sustainable development of Meshkin Shahr city	The results showed that services such as telecommunication, post, banking, payment of bill) have been used more than internet services
Komar, K and Charls, 2009	Study the quality of banking service in Malaysia	Quality of services has direct impact on customer satisfaction, the lowest quality gap was related to physical and tangible and the highest gap was related to empathy.
Zeng, Ling, Shinfam, 2011	Quality of mobile retail in China	All five dimensions of quality has indirect impact customer satisfaction

Methodology

This study in terms of purpose is applied and in terms of time is cross-sectional. Collecting Information were done through librarian method (taking notes from books, articles and Internet resources) and field (questionnaires, observation, interviews with officials and heads of households). The sample population of the study with error of 0.05 have been calculated in the table below using a modified Cochran formula. 255 questionnaires were designed (due to lack of cooperation and the limits of filling the questionnaire) and 27 questions randomly distributed among citizens. Construct validity was performed by confirmatory factor analysis method.

Table 3: Sampling sufficiency

KMO index	0.808
Bartlett's test	4645.066
Freedom degree	435
Significance level	0.000

The value of KMO index is 0.808 (appropriate index is more than 6.0), the number of statistic samples is sufficient for factor analysis. Also the significance level of Bartlett's test is less than 0.05 percent, which shows the factor analysis is appropriate factor to identify the structure .in table 4, four extraction subscription of factors is shown that show the amount of variants questions explanation. In this step, the factors were eliminated which their extraction subscriptions are less than 0.5. Because, small amount indicates that the factor has no relationship with other factors and

this process will continue as long as the extraction subscriptions value be more than 0.5. The following values were obtained in this research.

Table 4: Extraction subscriptions results

Factors	Subscription Extraction	Factors	Subscription Extraction
1	0.716	20	0.814
2	0.646	22	0.743
3	0.795	23	0.760
4	0.856	25	0.721
5	0.847	26	0.655
9	0.693	27	0.666
10	0.745		
11	0.736		
12	0.739		
15	0.803		
16	0.842		
17	0.746		
19	0.760		

According to the results, the factor extraction subscriptions less than 0.5 were eliminated in this step. There are no factors that have extraction subscription less than 0.5 in this step. Cronbach's alpha coefficients for questions were 0.924 that indicate acceptable reliability of the questionnaire. Single sample t-test and Friedman with application of spss18 software were used to analyze the data.

The area of study

The region covers an area of 822.09 hectares; approximately 1.15% of the total area of Tehran (tourism master plan of Tehran 17th region, 2013). This area is one of the 22 districts of Tehran with urban function. This area is one of the important areas of South Tehran. The modified have special characteristics. Its proximity to the center of Tehran is one of the positive features that respect and using the potential of the region is able to help Tehran by change the area from current condition to sustainable urban development in line with future developments. Population of 17th district of Tehran municipal in 2011 reach to 256,022 people, which represents a negative population growth and migration from this region to other areas. The whole resident families in this area are 70563 households. District 17th of Tehran Municipality is located almost in the southwest of Tehran and is limited to:

From the North and North West: Qazvin street from Safavi intersection to the Azari street and Azari three-way

From South and Southeast: Gale-Morghi to Zamzam street

From the East: Nawab Safavi and Abdullah streets

From the West: Saveh village and Yaft Abad Tehran (Tourist Guide, district 17).

District 20 (Rey city) is the most southern district of Tehran municipality with an area of over 2264 hectares. Area is located from north adjacent the regions of 15, 16 and 19 of Tehran and its limitation is Azadegan motorway ring road from the West at the end of Khavaran road to the east side of Abbas Abad Road in the vicinity of Pakdasht municipality toward the south to put great hGol Tappeh Kabir, close to Varamin road, in south from Varamin path to Iran Transfo three ways in the vicinity of the Baghershahr municipal and the West from Komite town and Salehabad highway to the north to Azadegan Highway 19 in the vicinity of 19t district of Tehran's Municipality (Daroodi et al., 2014: 160).

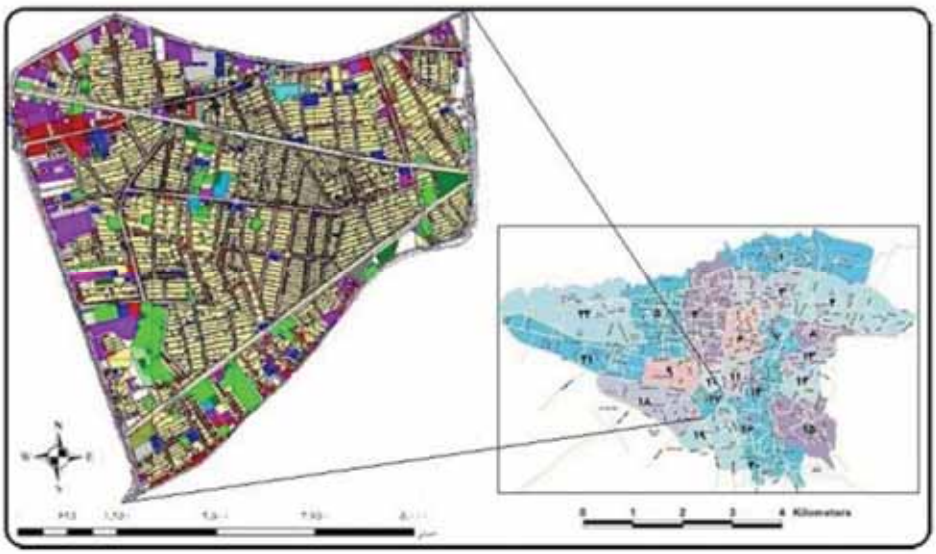

Figure 1: The area of district 17 of Tehran (Ahmadi et al, 2013: 57)

The region has 7 districts and its gross population density is 131 people in hectares. This area has a population of over 450,000 people, of which 368 265 people living in the metropolitan area and the rest are resident in area.

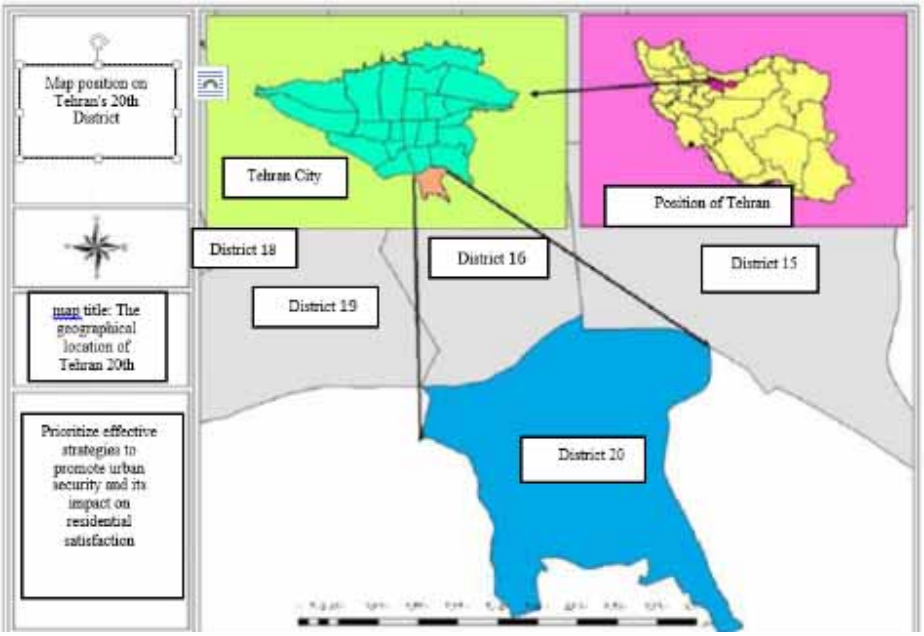

Figure 2: Position of 20th District of Tehran

Findings of the study

A) Gender

Obtained answers from collected questionnaires are shown in table 5. According to this table, 199 of the respondents (78 percent of the samples) are men and 56 people of respondents (22% sample) are woman.

Table 5: The frequency distribution and percent of the sample responses to the question of gender

Response type / Responses quantity	Man	Woman	No-response	Total
Frequency	199	56	------	255
Percent	78	22	------	100

B) Marital status

Obtained responses from collected questionnaires to the above question are shown in Table 6. Based on the table above, 39 people of the respondents (15.3 percent of the sample), are single and 216 people of respondents (84.7 percent of the sample) are married.

Table 6: The frequency distribution and percent of the sample responses to the question of marital status

Response type / Responses quantity	Single	Married	No-Response	Total
Frequency	39	216	0	255
Percent	15.3	84.7	0	100

C) Age

Obtained responses from collected questionnaires to the above question are shown in Table 7. Based on the table above; 4 people of the respondents (3.6% of the samples) are under 25 years, 57 of the respondents (50.9% of the samples) are 25 to 35 years, 34 of the respondents (30.4 sample) are 36 to 45 years, 15 people of the respondents (13.4 percent of the samples) are 46 and 55 years and 2 people of the respondents (1.8% of the samples) are over 55 years old.

Table 7: The frequency distribution and percent of the sample responses to the question of age status

Response type / Responses quantity	Under 25	25-35 years	36-45 years	46-55 years	Higher than 55	total
Frequency	10	77	108	56	4	255
Percent	3.9	30.2	42.4	22	1.6	100

D) Level of Education

Obtained responses from collected questionnaires to the above question are shown in Table 8. On the basis of the table 13, 12 of respondents (4.7% of the samples) are high school diplomas, 33 respondents (12.9 percent of the samples) are associated degree, 157 respondents (61.6% of the samples) are Bachelor and 53 respondents (20.8% of the samples) are master graduate and higher levels.

Table 8: The frequency distribution and percent of the sample responses to the question of education level status

Response type / Responses quantity	High school graduated diploma	Associated degree	Bachelor	Master and higher	Total
Frequency	12	33	157	53	255
Percent	4.7	12.9	61.6	20.8	100

Statistical description of the evaluation of ICT

Table 9: The frequency distribution and percent of the sample responses to the question of ICT realization level

expression	Very low		low		moderate		High		Very high		No response		total
	Frequency	Percent	Frequency	percent	Frequency	percent	Frequency	percent	Frequency	percent	Frequency	percent	
1	68	26.7	80	31.4	61	23.9	41	16.1	5	2.0	0	0	255
2	66	25.9	99	38.8	58	22.7	24	9.4	8	3.1	0	0	255
3	123	48.2	59	23.1	57	22.4	16	6.3	0	0	0	0	255
4	125	49	92	36.1	28	11	10	3.9	0	0	0	0	255
5	101	39.6	87	34.1	49	19.2	18	7.1	0	0	0	0	255
6	100	39.2	87	34.1	51	20	14	5.5	3	1.2	0	0	255
7	56	22	91	35.7	69	27.1	37	14.5	2	0.8	0	0	255
8	118	46.3	81	31.8	50	19.6	6	2.4	0	0	0	0	255
9	123	48.2	77	30.2	43	16.9	12	4.7	0	0	0	0	255
10	57	22.4	67	26.3	71	27.8	60	23.5	0	0	0	0	255

The variance explanation table

At exploratory factor analysis, the actors are determining that remain in analysis. In this table, made clear the number of identified factors and amount of variance explanation for each of them. According to the output results of SPSS analysis can be expressed that here the first 10 factor has special vectors greater than one and remain in the model.

Table 10: The variance explanation table

Specific amount of Extraction factor with rotation			Specific amounts			Levels
Cumulative percent	Variance percent	Total	Cumulative percent	Variance percent	total	
28.931	28.931	3.579	33.092	33.092	7.928	Human
55.539	27.608	3.482	61.160	28.067	1.720	Cultural & social
80.021	25.369	3.111	80.021	19.861	1.058	economical

According to the above three factors have special vectors greater than one ,the first factor is about 29%, the second factor is 28% and the third factor explained 26% of the variance. Also the cumulative variance is equal to 80.021 percent. This means that these three factors explained 80% of questions variance. The amount of cumulative variance must be greater than 60 percent.

Independent-sample T-test

In analysis of average, available fields' analysis to consider the impact of information and communication technology is examined and indicates the low degree of these fields. According to the simple sample t test by calculating the available spectrum range that have tolerance between 1 to 5 based on Likert spectrum, this amount is evaluated for all dimensions less than moderate condition and their difference of number desirability is evaluated and estimated in negative form (table 11)

Table 11: Analysis of the available fields for the development of information and communication technology, based on independent sample t-test

	Numerical desirability of under testing index-3						
Components	Components	Average	t-test statistics	Significance level	Difference from desire level	Confidence distance	
						Lower	Higher
Human	2.54	-2.540	0.006	-0.117	-0.199	-0.199	-0.035
Cultural and social	2.23	-4.453	0.000	-0.247	-0.353	-0.353	-0.14
Economical	2.13	-6.047	0.000	-0.347	-0.458	-0.458	-0.237
Total	2.11	-7.011	0.000	-0.237	-0.304	-0.304	-0.170

Friedman test

According to table 12 and Friedman test, there is a significant difference between the average of available indicators to development of information and communication technology. In the meantime the highest rating average is related to human indicators and the lowest is related to sustainable development of economic infrastructure. The study of rating average of resultant data of available fields to development ICT, indicates being below of these fields to lower than moderate level

Table 12: Significance of mean difference of available fields to the development of information and communication technology, based on table12: Friedman's test statistic

Fields	Numerical average	Rating average of freedman
Human	2.45	2.35
Cultural and social	2.53	2.21
Economical	2.31	2.09
KIDO	12.057	
Freedom degree	4	
Significance level	0.004	

Conclusions and recommendations

Information and communication technology has created new opportunities for different communities. This leads to the opportunities faster, can make up their backwardness and be effective in improve the quality of inhabitants life by structural mutation. Information and communication technology is one of the most important factors that can effective in promoting their knowledge level and education by correct and on time informing and provide the fields and comprehensive infrastructures of urban sustainable developing. Results of this study based on Friedman test indicate that there is a significant difference between the average of available indicators to development of information and communication technology. In the meantime the highest rating average is related to human indicators and the lowest is related to sustainable development of economic infrastructure.

The study of rating average of resultant data of available fields to development ICT, indicates being below of these fields to lower than moderate level. Also according to the research results based on single sample t test for all dimensions are evaluated lower than moderate and their difference from number desirability is evaluated and estimated in negative form. According to analyzing the research findings and results of this research in order to improving the ICT situation in selected districts of research are recommended these suggestions to achievement sustainable development:

• The development of information and communication infrastructures in order to development of e-government activities in the districts

• Linking between urban institutions with Information and Communication Technology offices

• Holding Training courses of e-government and related activities in selected districts

• Survey of citizens in the field of adaptation of ICT activities on the needs and problems of selected districts residents

• Producing audio-visual programs to promote ICT

References

Ahmadi et al, S. (2013). Spatial analysis of crime patterns in District 17 of Tehran Municipality, Journal of Applied Research in Geographical Sciences, 31, winter.

Azkia, M., & Iman, A. (2008), Sustainable Rural Development. Tehran: Etelaat publication

Castells, M. (2001). The information age, the rise of the network society (A.Alighiliyan and A. Khakbaz). Tehran: Tarhe –No Publication.

Darnell, J., & Feder, J. (2005). Network World: An Introduction to the theory and practice concerning the information society (Trans: A.Dehghan and M.Mohamy), Tehran: Chapar Publication.

Daroodi, M. (2014). Prioritizing the effective strategies to promote urban security and its impact on residential satisfaction study in District 02 of Tehran Municipality, Journal of Geography law, VI.

Goldkuhl, G. (2007). What does it mean to serve the Citizen in E-Services, International Journal of public Information Systems (IJPIS), 3 (3), 135-159.

UNDP (2004). ICT and human development: Towards building a composite index for Asia.

Vedakumari, V. (2005). Information and Communication Technologies (ICTs) For Rural Development. Journal of Rural Development, 24(3), 399-408.